

# EVALUATION OF FUNGICIDES AND A FERTILIZER FOR CONTROL OF PHYTOPHTHORA BLIGHT IN MADAGASCAR PERIWINKLE – EXPERIMENT ONE

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**INTRODUCTION.** Phytophthora blight caused by *Phytophthora nicotianae* (syn. = *P. parasitica*) is one of the most damaging diseases of Madagascar periwinkle (*Catharanthus roseus*, a.k.a. “vinca”) in Florida. Symptoms of the disease may include root, crown and stem rot, discoloration of shoot tips and foliage, followed by defoliation, wilting, and plant death. One shoot or the entire plant may be initially infected. Total losses of landscape plantings at wet sites are not uncommon, and considerable losses in the production of vincas as transplants and potted plants may also occur. Our research objective was to evaluate the effectiveness of commercially available and experimental fungicides, and a fertilizer for the control of Phytophthora blight in Madagascar periwinkle.

**MATERIALS & METHODS.** The experiment was conducted in west central Florida in a greenhouse at the Gulf Coast Research and Education Center. Experimental plants were provided by 6-week-old Madagascar periwinkle ‘Peppermint Cooler’ grown in “six-packs” containing a peat-based medium (Fafard #4). The experiment used a randomized complete block design with eight replications consisting of individual six packs per fungicide treatment and non-treated control. Fungicides including Hurricane 48 WP (Mefenoxam and Fludioxonil), Medallion (Fludioxonil), Subdue Maxx (Mefenoxam), two rates of Heritage (Azoxystrobin), and the fertilizer, Phorus (0-31-23), and Phorus + Subdue Maxx were applied as 5 ml soil drenches to each six-pack cell. Fungicides were reapplied twice more at a 2-week interval. Control plants received an equal volume of water.

Plants were inoculated with *P. nicotianae* 9 weeks after transplanting into six-packs and 48 hours following the initial fungicide application by pouring 5 ml of a zoospore suspension ( $7.8 \times 10^4$  zoospores/ml) of the pathogen into each cell, plus an additional 5 ml/six-pack added into the plastic saucer. Thereafter, the saucers were kept constantly filled with water. Plants were maintained in a greenhouse for 6 weeks at average high and low temperatures of 79 and 59°F, respectively. Plants were fertilized with a water-soluble fertilizer (Nutricote 20-20-20) applied at concentrations that furnished about 50 ppm N at every watering, supplemented every 2 weeks at a rate that provided 200 ppm N. Plants were examined for phytotoxicity, disease (stem rot) incidence, and mortality for 6 weeks after inoculation. Root rot, defoliation, flower number and diameter, and shoot weights were obtained at the end of the experiment. Root

rot severity was estimated using a 1-8 rating scale (1=0%, 2=1-10%, 3=11-25%, 4=26-50%, 5=51-75%, 6=76-90%, 7=91-99% and 8=100% root discoloration). Defoliation was assessed using a modified Horsfall-Barratt rating scale where 1 = 0% and 12 = 100% defoliation. Flower number and shoot weight were based on all surviving plants. Representative roots and stem segments exhibiting rot were tested for infection by *P. nicotianae* using a *Phytophthora*-selective medium following surface disinfections in 0.5% NaOCl. Treatment means were separated by Fisher's Protected LSD Test following appropriate transformation of percentage data.

**RESULTS & CONCLUSIONS.** Phytophthora blight rapidly developed in controls; after 6 weeks, disease incidence and plant mortality in non-treated plants reached 81% and 77%, respectively. *P. nicotianae* was consistently isolated from symptomatic root and stem tissue. All fungicides except Medallion and the lowest rate of Heritage significantly reduced Phytophthora blight incidence, with Phorus + Subdue Maxx being the most effective. Subdue Maxx, Hurricane, Phorus and Phorus+Subdue Maxx reduced plant mortality with equal efficacy, while the high rate of Heritage was of intermediate effectiveness. Subdue Maxx and Phorus + Subdue Maxx were the most effective treatments in reduction of root rot, and Hurricane, Phorus and the high rate of Heritage were the next most effective treatments. Hurricane and Phorus + Subdue Maxx were the most effective in defoliation reduction, while the high rate of Heritage, Phorus, and Subdue Maxx were of intermediate effectiveness. The fresh weight of shoots was significantly reduced by Medallion and the low rate of Heritage, and increased by Subdue Maxx, Hurricane, and Phorus + Subdue Maxx, with the latter treatment being the most effective. The average number of flowers/plant was significantly reduced by Medallion and the low rate of Heritage, and significantly increased by Phorus + Subdue Maxx. Flower diameter was significantly reduced by Phorus. Plant distortion and necrosis following application of the treatments was not observed. However, reduction of shoot weight, flower number per plant, and flower size represent other possible symptoms of phytotoxicity.

SubdueMaxx, rate/100 gal	Disease incidence (%)	Plant mortality (%)	Root rot severity (%) <sup>1</sup>	Defoliation (%) <sup>2</sup>	Shoot fresh weight (g)/plant	Flower number/plant	Flower diameter (mm)
Non-treated control	81.2 a <sup>3</sup>	77.1 a	74.3 a	95.8 a	5.3 d	2.2 bc	33.4 ab
Medallion, 1.0 oz	83.3 a	72.9 a	76.9 a	96.1 a	1.8 e	1.1 e	29.9 b
Heritage, 0.9 oz	81.2 a	59.6 ab	68.5 a	86.1 ab	2.9 e	1.2 de	30.5 ab
Heritage, 1.8 oz	54.2 b	41.7 b	47.0 b	79.9 b	6.4 cd	2.5 bc	33.5 ab
SubdueMaxx, 0.5 fl oz	20.8 c	12.5 c	14.8 de	30.9 c	8.1 bc	3.0 ab	34.4 ab
Hurricane 48 WP, 1.5 oz	6.7 cd	4.6 c	14.0 d	9.6 d	8.6 b	3.0 ab	34.8 a
Phorus 0-31-23, 2% v/v	27.1 c	6.3 c	28.7 c	39.5 c	6.6 bcd	2.1 cd	24.7 c
Phorus 0-31-23, 2% v/v + SubdueMaxx, 0.5 fl oz	0.0 d	0.0 c	3.8 e	4.2 d	11.1 a	3.9 a	30.1 b
<i>P</i> value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	≤0.0003

<sup>1</sup>Root rot severity was estimated using a 1-8 rating scale where 1=0% and 8=100% root discoloration.

<sup>2</sup>Defoliation was estimated using a modified Horsfall-Barratt rating scale where 1 = 0% and 12 = 100% defoliation.

<sup>3</sup>Means within columns followed by different letters are significantly different by Fisher's LSD. Arc sine square root transformation was used on percentage data; non-transformed means are presented.